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ABSTRACT

The methodological aspects of the behavior analysis movement are often overlooked in favor of focusing on the powerful effects of rewards and punsihments used systematically in a behavior-modification paradigm. The methodological aspects are important for the topic of research on teaching because they create a situation where the teacher acts both as a data collector and a verifier of instructional strategies. Such behavior is referred to as analytic teaching. Each of the major behavior-analysis teaching models utilizes one of the following teaching approaches: (a) a precise description of behavior categories under consideration; (b) attention paid to specific relationships among the situations in which target behavior occurs, and the behavior and consequences which accrue to the behavior; (c) continuous monitoring of the behavior; and (d) analysis of effects of the instructional variable. Analytic teaching requires the teacher to take an active role in educational decision making because the decisions are based on data collected by the teacher. This prevents the passivity that so often characterizes teaching in schools. (Also included is a list of references and a set of figures illustrating the behavioral approach to teaching and a list of school-related behaviors modifiable through contingent social praise by a teacher.) (Author/JS)

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BEHAVIOR MODIFICATION*

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Over the course of the past 15 years behavior modification has been used in a sufficiently broad spectrum of human behavioral situations so that today hardly anyone questions the notion that behavior can be changed by judicious application of contingencies of reinforcement. While many still question whether behavior should be changed--manipulated is the term they prefer to use--few would argue seriously that human behavior is not susceptible to the effects of rewards and punishments.

Behavior modification is no stranger to education, although the interface between the two has only a short history. When the first Handbook of Research on Teaching was published, applied behavior analysis was in its infancy and not a sufficiently legitimate enterprise to merit specific attention in that volume. The degree to which behavioral models are clearly evident in the more recently published 2nd Handbook of Research on Teaching gives evidence of the rapid spread of behavior analysis. John Nolan (1974) recently stated in the Teacher's College Record that "a flood called behavior modification is sweeping our schools." While that is a pleasant thought, it is an overstatement. If it is a flood in the area served by Teacher's College, it is little more than a puddle in the Midwest, and, if someone, like Mr. Kleinman or Max Rafferty or Woody Hayes, who objects to it steps on a behavior mod program with force, it usually splatters to a sufficiently wide area so that it tends to dry up and go away. Still, when a venerable institution such as the National Society for the Study of Education decided to devote its yearbook to the topic of Behavior Modification in Education (1973), perhaps it was an indication that it is here to stay for awhile.

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As is common with an emerging technology, some very important features of the behaviorist framework are badly misunderstood and other important factors do not receive nearly the attention they should. This is particularly true as regards the implications of the behavioral model for the topic of research on teaching. Full utilization of any of the current behavior analysis models for teaching would change entirely our conception of research on teaching because their implementation would require that teachers engage in the research process themselves. This must sound ghastly to all of you who were weaned in the group research model that requires careful sampling procedures and N's of 30. It must sound equally questionable to those of you who have tried to investigate responsibly the research literature on teaching, only to speculate about what it all has to do with the day to day tasks of helping students learn sport and play skills in the gymnasium. The idea that the gymnasium might be legitimately viewed as a laboratory--that the teacher might legitimately engage in pursuits that meet the criteria for research--is a radical notion, one that most of you will want to dismiss as unrealistic. Still, the model for what I prefer to describe as analytic teaching--where the process of teaching generates information that can be labeled research--is precisely the approach I want to describe to you this afternoon.

Let me begin to explain the behavioral position by describing a research study and pointing out some important principles that the study illustrates. Changes in behavior generated by social reinforcement are considered by the behaviorist to be the specific product of a response-reinforcement contingency. Many have suggested that these kinds of behavior changes are more likely the result of a general warm, accepting learning environment brought about by a teacher's increased use of social praise. Baerrand Wolf (1970) examined this hypothesis in attempting to

Insert Figure #1 here.

increase cooperative play in a preschool child. Ten days of baseline observation indicated that the child spent approximately 2% of her school day in cooperative play. During this baseline period it was also observed that teachers interacted with the child about 20% of the time, although not all of it was positive interaction. In the seven days following baseline, the teachers attempted to increase the amount of social reinforcement that accrued to the child. They stood nearer to her, attended closely to her activities, smiled at her, laughed with her, touched her, and verbally praised her. This heavy dose of reinforcement was not contingent upon any specific response emitted by the child but rather generally available in a noncontingent arrangement. The results are clear: the child's rate of cooperative play was not affected despite the fact that the increased social reinforcement attracted other children to the scene, thus making opportunities for cooperative play more frequent. During the next 12 days teachers made social reinforcement contingent upon the emission of nine classes of very specific activities grouped into four general categories of cooperative play. The amount of response-contingent social reinforcement during this twelve day period was approximately half that used per day in the previous seven day noncontingent reinforcement phase of the study. The results are equally clear: the child's rate of cooperative play increased from its usual 2% to a high of 40%. In order to demonstrate that the specific response-reinforcement contingency was responsible for the change, a four day period of noncontingent reinforcement was reinstituted. During this reversal phase, all of the gains were lost even though the amount of reinforcement provided was similar to that used in the response-contingent phase. The study was concluded with a return to the response-reinforcement contingency for cooperative play, and the rate of that behavior category recovered to a more desirable level, allowing the teachers to utilize social reinforcement on a more intermittent basis, thus weaning the child from the special control of the experimental contingencies and shifting the control to those elements in the

social and physical environment that normally maintain cooperative play among children.

This study illustrates well what I consider to be the essential elements of a behavioral approach to teaching, an approach in which teaching becomes a research process. First, there was a fairly precise description of the behavior

Insert Figure #2 here.

category under consideration. Second, there was attention paid to the specific relationships between the situation in which the behavior occurred, the emission of the behavior, and the consequences that followed the behavior, what Skinner has referred to as the contingencies of reinforcement. Third, there was continuous monitoring of the behavior. Fourth, there was an analysis of the effects of the instructional variable, in this case social praise from teachers.

I would like to assume, for purposes of this symposium, that the notion that consequences can modify the rates of occurrence of school behaviors is an accepted fact. This assumption takes into account teacher verbal and nonverbal behaviors as consequences as well as other events that might be used as reinforcers in an educational environment, from primitive uses of M & M's to sophisticated contingencies involving access to engage in high probability behaviors in the tradition of David Premack. The range of behaviors that have been shown to be modifiable through the application of a variable as available as contingent social praise by a teacher is sufficiently broad and varied to lend considerable credence to the proposition that the empirical law of effect does indeed deserve status as a law of human behavior.

Insert Figure #3 here.

The behavioral model for teaching and, consequently, for research on teaching has emerged as a technology for teaching individual students; i.e., for dealing with the academic and social behaviors of individuals. Contrary to popular

opinion, this technology is not solely grounded in the concepts of reinforcement and punishment. As important as an understanding of consequences is to this model, it is equally important to recognize the methodological implications that derive from using applied behavior analysis. Many feel that Skinner's greatest contributions were methodological, namely the use of frequency of occurrence as a basic datum and establishment of baseline logic for analyzing individual behavior across time as a function of various intervention strategies. Many years ago Gordon Allport called for an idiographic rather than a nomothetic approach to education evaluation. Few in teaching or educational research have heeded that call. Studies of individual differences and individual student performance are still conducted using methods only appropriate for groups.

The behavior analysis teacher is a data collector--an analyzer of individual student performance as affected by various factors in the educational environment. Masking idiosyncratic behavior patterns in means and "standard" deviations is inconsistent with this model. The intensive study of the single subject is an important methodological contribution of the behavior analysis model. It forms the basis for the analytic teaching framework found in the major variations of the behavioral model, namely the responsive teaching model of Vance Mall, the directive teaching process advocated by Tom Stephens, and Ogden Lindsley's precision teaching. In each of these variations, student behavior is clearly defined and consistently monitored, creating a situation where the individuality of the student is most likely to be enhanced and preconceived teacher assumptions less likely to impinge upon individual student growth. A behavior analysis teacher does not make guesses or assumptions. The model requires that the teacher understand the social and academic performance levels of students, their likes and dislikes, and the activities they value. This understanding comes from the data generated by monitoring student behavior. These are the data used to make

educational decisions on a day to day basis. The data tend to control the teacher, thus minimizing the possibility of a Pygmalion in the gymnasium.

Teachers are scientists to the degree that they verify the results of their instruction. Measurement is not enough. Measurement, even consistently and reliably done, will show changes in student behavior but not what factors in the educational setting might be responsible for the changes. It is at this point that baseline logic provides a convenient means for teachers to verify their attempts to effect changes in student social and academic behavior patterns. By comparing baseline and intervention frequencies sufficient information can usually be generated to analyze the degree to which the instructional treatment conditions were responsible for any changes in performance that may have occurred. Here too it is the data which to a substantial degree control the behavior of the teacher. Just as the behavioral model minimizes the effects of preconceived notions about student capability, so too does it minimize the effects of biases and expectations about curriculum content and the process by which a curriculum is presented to a learner.

It should be emphasized that a behavior analysis approach to teaching does not represent a content or process model. The elements of the behavioral approach cited earlier can be utilized within any of the currently popular curriculum and process models. Ogden Lindsley has spoken to this issue in citing the applicability of his precision teaching approach to current movements in education.

> The funny anachronism that faced us in the 1950's in human learning research was that the method which Skinner had developed to assess general laws of behavior also was the most appropriate one to study individual differences, and those studying individuals were using methods only appropriate for groups. Right now we have a similar problem where the most dynamic and, I think, the most efficient and exciting learning trends and ideas are those coming out of Piaget, Neill's Summerhill, and the British Open School. However, the evaluation methods used for these new classroom ideas and theories are ones which <u>by design</u> can pick up only similarities and general

> trends among people. So a pay off area would be to take these highly unique and different types of open classrooms and use precision-teaching techniques to monitor the improvement and growth of each child, working on his own custom tailored curriculum program. (Lindsely, 1974, pps. 389-390)

This is not to suggest that there are not distinct behaviorally oriented process models. The growth of contingency management and token economies clearly demonstrate the viability of a behavioral system for delivering a particular curriculum. Contingency management and token economies rely heavily on the use of powerful consequences to motivate student progress through a particular academic curriculum or to behave consistently within the framework of rule governed social behavior. The Hall, Stephens, and Lindsley approaches, while not ignoring the area of motivation, emphasize the methodological aspects of the behavior analysis approach, utilizing fairly standard strategies for changing and maintaining student progress academically and socially.

The day to day implementation of a behavior analysis approach need not place undue demands upon the teacher. Naturally, a teacher cannot observe the separate behavior patterns of each student in a class. All of the behavioral models utilize self-recording and peer-recording, relying on teacher recording only in those instances where a special change is thought to be needed not directly related to the on-going academic and social atmosphere of the educational setting. Teachers and peers can spot check recordings to assure that the data are reliable. The precision teaching model relies primarily on self-recording of behavioral data, and it does so in educational settings as early as the kindergarten (Bates and Bates, 1974). Nor is the technology of consistently monitoring behavioral data limited to the number of math problems a student might do correctly or the time spent studying a reading lesson. As Lindsley points out, the approach is rapidly extending to what Skinner has called the world of private behavior.

> Measuring the frequency of behavior was developed to record the <u>outer</u> behavior of people. Recently we have been charting inner behaviors

> like success thoughts, anxiety feelings, joy, love, and compassion. How many times a day do you feel compassionate? How many ecology thoughts did you have today? Charting may be one of the few sensitive techniques that we have to keep track of these inner thoughts, feelings, and urges. It could be that precision teaching will ultimately provide man with the most good and the most help by being applied to his inner behaviors. Thus, some future strategies include using precision teaching to monitor students in open dynamic classrooms and letting them chart their own social interaction and self-concepts. (Lindsley, 1974, p. 390)

Notice that even within the concept of an open classroom, using a precision teaching format, and focusing on an "inner" behavior, we have not lost the basic elements of analytic teaching. "Success thoughts" would have to be defined clearly. Students would chart the conditions under which they experience success thoughts, the kind of success thought experienced, and the events that occur immediately subsequent to the success thoughts. These success thoughts would be monitored continuously for a period of time to establish baseline data. At that point, depending on the model from which the classroom operates, the teacher or the student might decide upon an intervention strategy for increasing success thoughts. The strategy would be applied and the resulting data would be compared against baseline date to see what changes might occur. If a change does occur, it would remain for the student and teacher to utilize one of the several strategies available in a reversal or multiple baseline format to show that the change was due to the intervention strategy and not to some unexplained factor. The result of all of this can legitimately be viewed as research, and it is in this sense that I suggest that the gymnasium can become a laboratory and the physical education teacher a scientist--an analytic teacher.

In the January 1975 issue of The Educational Forum Vincent Crockenberg traced the recent history of attempts to improve teaching in schools and their dismal failure. Noting that critics from Dewey through Broudy and Silberman have commented on the apparent mindlessness of too many teachers, Crockenberg set out to argue that poor teachers are made not born, and that they become mindless

because they are denied the conditions necessary for innovative and thoughtful teaching due to the manner in which schools are organized and run. Crockenberg is absolutely correct when he suggests that any reform proposal for education that fails to take into account the conditions under which teachers acquit their professional responsibilities is doomed to failure. This is true for community control of schools, performance contracting, packaged curricula such as Distar, and the many, many packages sent down from the network of R & D centers. The common element in each of these efforts is that the teacher is placed in the role of a passive consumer, using programs and procedures developed by others who are supposedly specialists in educational research. This R & D model has over the past decade permeated the educational establishment. It is an elaboration on the theory into practice model, and it is based on the assumption that a technology of education will grow from a science of learning. There are many reasons why that assumption might be questioned but for my purposes today it appears to me to be terribly limited because it places the teacher in the role of consumer. Indeed, Anne Rothestein (1973) recently elaborated on the theory into practice model by discussing the technical and conceptual skills needed for teachers to be intelligent "consumers" of research. The R & D model is a necessary aspect of improving education. The development and dissemination of reliable information to teachers is a prerequisite for educational practice to be cumulative. Alone, however, it will fail as have most other theory into practice models.

The basic datum of education is student behavior. Those who work most intimately with this basic datum are teachers. We know that human behavior is incredibly unique, often specific to situation, and not very usefully approached from general descriptions or prescriptions. For teachers to move from a primarily passive role to a primarily active role, they must be fully cognizant of student behavior in its social, emotional, and academic forms, they must be aware of how

these behaviors are changing over the course of time, they must relate their instructional strategies to these changes in behavior, and they must verify that the strategies were or were not responsible for specific changes. Teachers who operate within this context would hardly be described as mindless. The decisions they make will be important and they will be based on accumulated data rather than guesses or judgments mande in Regional Labs. This is the heart of analytic teaching, to my mind the major contribution the field of behavior modification has to make to research on teaching.

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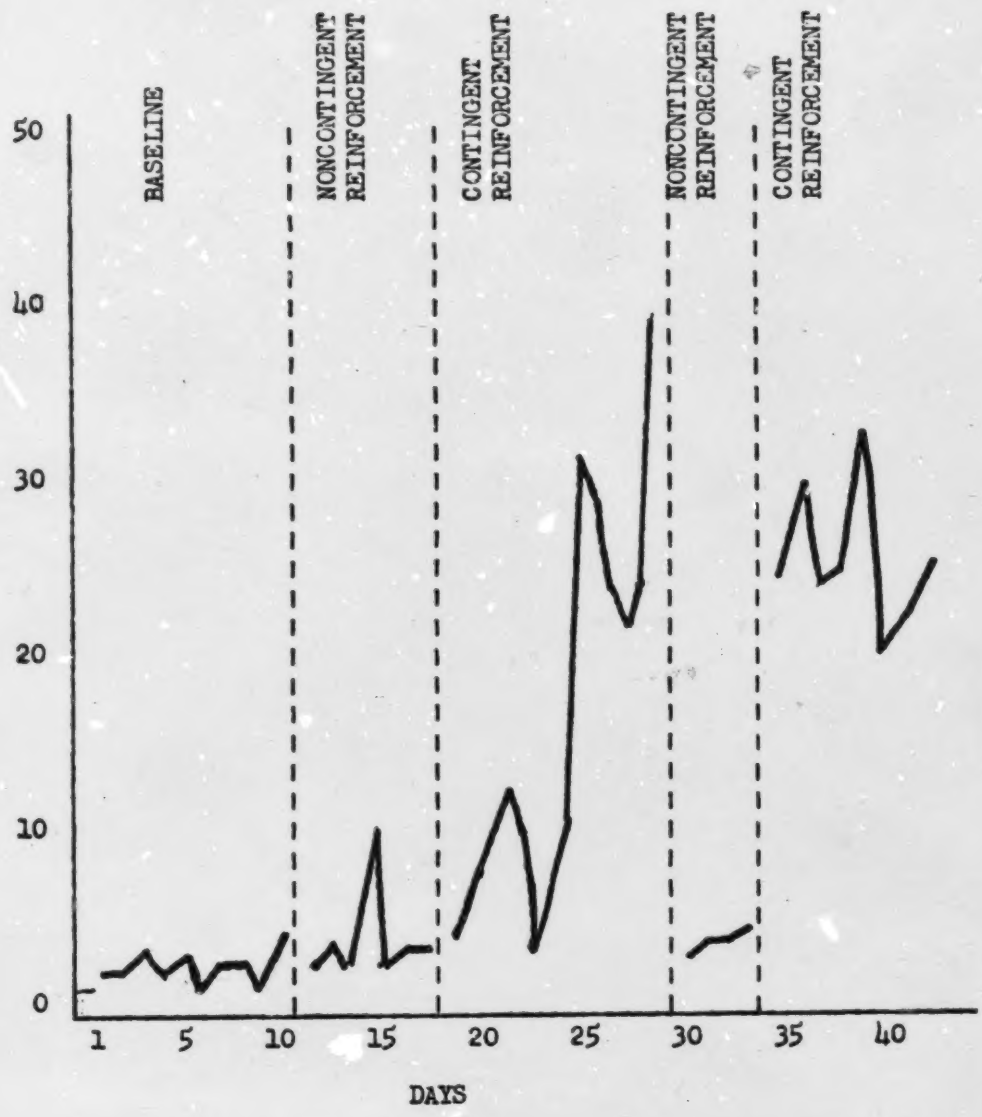

Figure 1: PERCENTAGE OF TIME THAT A PRE-SCHOOL CHILD ENGAGED IN COOPERATIVE PLAY BEHAVIOR (Baer and Wolf, 1970)

ESSENTIAL ELEMENTS OF A BEHAVIORAL APPROACH TO TEACHING

1. Clear description of the behavior category under consideration
2. Attention paid to the specific relationships between:
    a. the situation in which the behavior occurs
    b. the emission of the behavior
    c. the consequences that accrue to the behavior
3. Consistent monitoring of the frequency of the behavior
4. Analysis of the effects of the instructional variable

Figure 2

SOME SCHOOL-RELATED BEHAVIORS SHOWN TO HAVE BEEN MODIFIABLE THROUGH CONTINGENT SOCIAL PRAISE BY A TEACHER

Printing

Verbal articulation

Letter discrimination

Composition style

Academic achievement (math, social studies, science, standardized tests, etc.)

Peer social interaction

Homework turned in on time

Social integration of black children in a predominately white classroom

Tardiness

Attendance

Imitation

Aggression (physical and verbal)

Cooperation

Cooperative play

Teacher-student interaction

Disruptive behavior

On-task behavior related to academic work

Appropriate social behavior

Attention

Rate of work completion

Quality of work completed (error rate)

Homework taken home without assignments

Figure 3